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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/551,517	09/28/2005	William C. Breneman	3468-65972-06	6085

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KLARQUIST SPARKMAN, LLP  
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EXAMINER
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NGUYEN, NGOC YEN M

ART UNIT	PAPER NUMBER
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1793

NOTIFICATION DATE	DELIVERY MODE
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07/13/2010

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/551,517	<b>Applicant(s)</b> BRENEMAN, WILLIAM C.	
	<b>Examiner</b> Ngoc-Yen M. Nguyen	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 23 April 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                    | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

### DETAILED ACTION

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruff et al (5,066,472) in view of WO 03/033115 (using Hirano et al 2004/0258596 as unofficial English translation) and Terry et al (3,900,312).

Ruff '472 discloses a method for processing a chlorosilane containing residue produced as bottom product after the distillation of chlorosilanes from hydrochlorination or chlorination of silicon to recover the chlorosilanes and hydrogen chloride comprising: separating the chlorosilanes contained in the residue; treating the remaining residue with water vapor in the presence of additional hydrogen chloride to recover hydrogen chloride from a resulting gaseous mixture (note claim 1). The amount of steam added determines the degree of hydrolysis of the metal chlorides (note column 2, lines 23-24).

For the source of the residue, it would have been obvious to one of ordinary skill in the art to use any waste source, i.e. residue, from any the process as the starting residue to be treated in the process of Ruff '472 as long as such residue contains metal chloride(s) that need(s) to be removed.

The difference is Ruff '472 does not disclose (1) the use of a powdered hydrate to react with the metal chloride and (2) the presence of sodium chloride.

For difference (1), WO '115 discloses a method for removing a halogen series gas by contacting a gas containing halogen series gas forming at least one kind selected from the group consisting of HF, HCl, HBr and HI by water with a granule containing from 60 to 99.9 mass % of a solid base and from 0.1 to 40 mass% of a carbonaceous material to the total mass amount of the granule in the presence of water (note WO '115, claim or Hirano '596, claim 1).

WO '115 teaches that using a dry type treating method would make an apparatus smaller and simplify operation and maintenance of the apparatus (note WO '115, paragraph bridging pages 1-2 or Hirano '596 paragraph [0004]). The process of WO '115 can be carried without providing new equipment or a packing, it is possible to have water present necessary for forming an acid gas such as HF, HCl, HBr or HI from a present halogen series gas. Thus, it has been newly discovered that the problem can be solved by selecting a solid base such as sodium hydrogencarbonate or potassium hydrogencarbonate which form water by neutralization of the granule (note WO '115, page 3, middle paragraph or Hirano '596, paragraph [0009]). WO '115 teaches that the treatment of the hydrolysable present halogen series gas can be carried out by selecting a solid base forming water by neutralization as a solid base for the present granule without providing new equipment for a packing. Also, the present granule becomes an efficient removing agent by accelerating hydrolysis by the function of a pore volume and a specific area of an activated carbon contained therein (note WO

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'115, page 4, first paragraph or Hirano '596, paragraph [0011]). When the solid base in the granule is sodium hydrogen-carbonate or potassium hydrogencarbonate, it is water-soluble and most of reaction products with the halogen series gas are also water-soluble salts (note WO '115, paragraph bridging pages 12-13 or Hirano '596, paragraph [0050]).

It would have been obvious to one of ordinary skill in the art to replace the hydrogencarbonate used WO '115 with other solid base and when the other solid base does not contain water, it would have been obvious to one skilled in the art to include an additional source of water with the other solid base. Since WO '115 prefers a dry type treating method, one skilled in the art would select any appropriate solid source that contains water so that the residue can be treated in dry type treating method.

In Ruff '472, the remaining residue is hydrolyzed to obtain HCl in the presence of additional HCl, this step would require acid-resistant construction material for the apparatus because HCl is formed at high temperature (note claim 1). Thus, when the benefit of recovering the HCl from the metal chlorides in the remaining residue is less than the cost of the apparatus for carrying out the hydrolysis of the metal chlorides, it would have been obvious to one of ordinary skill in the art at the time the invention to simply neutralize the HCl to safely dispose of it.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to contact the remaining residue containing metal chlorides as disclosed in the process of Ruff '472 with a solid base, as suggested by WO '115 because the solid base could not only provide the water for the hydrolysis of the metal

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chlorides but also neutralize the HCl formed by the hydrolysis to render the remaining residue safe for disposal. The process as suggested by WO '115 could be carried out in the same apparatus for the step of separating the chlorosilane, and no acid-resistant material is required for such apparatus thereby lower the cost the equipment for the overall process.

For difference (2), Ruff '471 discloses that the residue contains aluminum and it is desirable to keep aluminum chloride from vaporizing (note column 1, lines 60-66).

Terry '312 is applied to teach that it is known and conventional in the art to add NaCl to aluminum chloride to lower the vapor pressure of the latter and thereby maintain the aluminum chloride in liquid phase (note claim 5, step c).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add NaCl to the residue of Ruff '471, as suggested by Terry '312 in order to lower the vapor pressure of the aluminum chloride contained in the residue and thereby maintain the aluminum chloride in liquid phase so that only chlorosilane is recovered in the separating step.

Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breneman et al (4,743,344) in view of WO '115 (using Hirano '596 as an unofficial English translation), Keller et al (3,878,291) and Terry '312.

Breneman '344 discloses a process for treating a waste slurry which includes silicon, iron, and aluminum metal particles, chlorides of iron and aluminum, silicon tetrachloride (STC) and trichlorosilane (TCS), and materials having boiling points which

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are lower than STC and TCS, with said STC and TCS being, in the aggregate, the predominant constituents of the slurry, comprising:

(a) feeding the said waste slurry to a first separation column, to provide STC, TCS, materials boiling lower than STC and TCS, and materials boiling intermediate STC and TCS as overhead from said first separation column, and to provide silicon, iron, aluminum metal particles and chlorides of iron and aluminum as bottoms in said first separation column which is passed to a waste storage vessel;

(b) condensing the overhead from the first separation column and passing this condensed overhead to a second separation column in which (i) STC is recovered as bottoms and (ii) materials boiling lower than STC, including TCS and materials boiling intermediate STC and TCS are recovered as overhead;

(c) condensing the overhead from the second separation column and passing this condensed overhead to a third separation column in which (i) TCS is recovered as overhead (ii) materials boiling intermediate STC and TCS are recovered as a bottoms waste stream (note claim 1).

Breneman '344 discloses that the concentrated metal chloride residue recovered are neutralized or combusted with a suitable hydrocarbon after being purged to the portable receiver (note column 2, lines 62-66).

The metal chloride residue in Breneman '344 comprises Si,  $\text{FeCl}_3$ ,  $\text{AlCl}_3$  (note column 4, lines 8-9).

The differences are Breneman '344 does not disclose (1) the step of heating the concentrated metal chloride residue with a powdered hydrate and (2) the addition of NaCl to the metal chloride residue.

For difference (1), WO '115 is applied as stated above to teach the advantages for using a solid base to remove the acid gas formed from the hydrolysis of the metal chlorides over the step of absorbing in water as disclosed in Keller '291. WO '115 teaches that dry type treating method is preferred because the equipment used can be smaller, easier to maintain and the operation is simpler.

Keller '291 discloses a process for the production of chlorosilane (note title). In the process, a solid residue comprising aluminum chloride, iron chloride as well as FeSi dust and ashes is formed. A solid liquid mixture is fed into a paddle dryer and a mixture of silicon tetrachloride and titanium tetrachloride is separated from the solids (note column 5, lines 32-45). After drying off the solids has taken place, steam is blown for hydrolysis. The hydrogen chloride set free is absorbed in water and returned to the process (note column 5, lines 50-57). Thus, Keller '291 fairly teaches the solid metal chlorides, such as aluminum chloride and iron chloride, can be hydrolyzed to produce HCl by treating it with steam, i.e. water vapor.

It would have been obvious to one skilled in the art at the time the invention was made to treat the solid impurities (i.e., solid residues) in the process of Breneman '344 by first hydrolyzing to produce HCl and then neutralize it by reacting the HCl with a base using a dry method as suggested by Hirano '856 because as evidenced by Keller '291, the solid residues in Breneman '344, which contains iron and aluminum chlorides, can



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be hydrolyzed to form HCl and because the dry method as suggested by Hirano '856 has the following advantages: enable prolongation of life, low cost, compacting of equipment, easiness of maintenance and treatment of a byproduct after removal, safety by reducing heat generation due to heat of adsorption, easiness of predicting life of a removing agent and the like by only one agent (note paragraph [0015] of Hirano '596).

For difference (2), Keller can further be applied to teach that sodium chloride is added to a stream containing titanium tetrachloride to form a complex sodium aluminum chloride which can be easily separated from the titanium tetrachloride (note column 5, lines 40-45).

Optionally, Terry '312 is applied as stated in the above rejection to teach the addition of sodium chloride to lower the vapor pressure of aluminum chloride.

For other dependent claims, note reasons as stated in the above rejections.

Applicant's arguments filed April 23, 2010 have been fully considered but they are not persuasive.

Applicants argue that WO 03/033115 is not prior art and should be withdrawn as a reference cited against this application because at least the independent claims of the claimed application are entitled to a priority filing date of April 1, 2003 because those independent claims are fully supported by U.S. Provisional Application No. 60/459,867.

Applicants' argument is not persuasive because it appears that there is no sufficient support in the Provisional Application '867 at least for these following limitations in Applicants' claims:

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In claim 1: “low volatility”; “in the absence of liquid water”; “at a temperature greater than 80°C”.

In claim 5: “from the production of methylchlorosilanes”.

In claim 7: “from the production of hafnium and zirconium chloride”.

In claims 8 and 15: “in the absence of liquid water”; “with a hydrate at a temperature greater than 80°C”.

In claims 14 and 21: “vanadium chloride...and zinc chloride”.

It is noted that in the Provisional Application ‘867, it is disclosed in step 3) “Subjecting the substantially non-volatile solid residues to the action of selected alkaline hydrate solids at a temperature in excess of about 80°C to yield a stable substantially neutral”; however, the temperature in this step is only for a process treating the residue from a chlorosilane manufacturing process, not for a process treating a generic “flowable solid material” as required in Applicant’s claim 1. Also this temperature is only applicable when “selected alkaline hydrate solids” are used, not for a generic “hydrate” as now required in Applicants’ claims 8 and 15.

The rejections are maintained because Applicants' claims are not fully supported by the Provisional Application ‘867 and thereby are not entitled to the priority filing date of the same Provisional Application.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen M. Nguyen whose telephone number is (571) 272-1356. The examiner can normally be reached on Part time schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ngoc-Yen M. Nguyen/  
Primary Examiner, Art Unit 1793

nmn  
July 12, 2010